

# Blockchain and Market Trends in Digital Infrastructure



REPORT

Blockchain M&A Opportunities



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## Stirling Infrastructure

PARTNERS LTD

Stirling Infrastructure is a leading advisor to institutional investors, listed companies and private market investors for capital allocation. The firm also provides M&A and asset management selection services across the industry sectors in which the firm specialises. Our capital raising and transactions team supports both investors and companies in collaboration to make effective investments. This includes blockchain and digital infrastructure.

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## FOREWORD

This paper is part of a series which explains the blockchain market and its use cases in industry. To achieve these aims, it offers a comprehensive overview considering both the current market and our own analysis on the future of blockchain technologies and digital infrastructure in enterprise. Especially when considering how M&A volume and blockchain innovations relate, we aim to demonstrate that blockchain is a technology on the brink of maturity and likely to see a large spike in usage over the coming years.

## EXECUTIVE SUMMARY

The blockchain technology market is currently at an inflection point in terms of growth in its use cases. As the technology matures over the coming years, we can expect high levels of growth across many sectors. Blockchain in enterprise can provide predictable revenue streams in established business models and, as industry leaders begin to recognise its potential, there will be large-scale adoption of the technology. Firms such as IBM already offer consulting services to provide custom blockchain solutions for a wide variety of applications, from payment systems to supply chain management solutions.

While it is important to consider how efficiency gains can be made when valuing blockchain applications, long-term planning and understanding of blockchain's drawbacks and limitations is also crucial. One should especially consider concerns with the security and scalability of the technology.

1. According to International Data Corporation, blockchain spending is expected to see high growth over the period 2020-2024, with 5-year compound annual growth rate at 48%.<sup>1</sup> This is mainly driven by significant increases in use in the financial services sector in the immediate future and, in the longer term, increased adoption in the supply chain management industry.
2. The core features of a blockchain database include the following: resistance to modification of data, trust built through consensus mechanisms, smart contracts, traceability of data, and layered protocols. The application and innovation in blockchain as a service generally seeks to capitalise on one or more of these core features, from which industries around the world can benefit.
3. Blockchain innovations are driving forward the growth in use cases and, over the coming years, we expect to see a significant increase in the number of enterprise solutions in blockchain due to improvements in two key areas: smart contracts, and supply chain management.

<sup>1</sup> IDC, Apr 2021. <https://www.idc.com/getdoc.jsp?containerId=prUS47617821>

## BLOCKCHAIN IN THE M&A MARKET

### OVERVIEW OF CURRENT BLOCKCHAIN M&A MARKET

#### Global Overview

Globally, there has been significant growth in the adoption of blockchain in digital enterprises and digital-intensive organisations. By offering disruptive solutions, both start-ups and larger firms have begun to lead the integration of blockchain in real business applications.

As illustrated in figure 1, the blockchain M&A market has demonstrated strong growth since 2016, even during the Covid-19 pandemic. Recent trends demonstrate that investors are most keen to invest in blockchain-focussed firms operating in cryptocurrency, financial services, and supply chain management services, which is mainly due to the ease of adoption of blockchain technology in these areas. In these sectors, the blockchain technology used is more mature and can be more easily integrated into existing ecosystems. Figures 4 and 5 highlight the prevalence of this in the current M&A market, showing the industry tags of acquirees and acquirers for 1000 M&As up to July 2021. The sectors in which blockchain technologies are more mature and able to be monetised show the highest levels of M&A activity.

Figures 2 and 3 shows the most active countries in the M&A market for blockchain-related firms, for 1000 M&As up to July 2021, with the US being a clear leader in terms of the number of M&A transactions conducted. This stems from the US being an early adopter of blockchain technology and the high concentration of technology-focussed firms in the US.

### CURRENT MATURITY OF BLOCKCHAIN TECHNOLOGY

Relative to other technologies, blockchain is still in its infancy, with many regarding the coming years as being a likely inflection point in terms of growth in use cases. Blockchain use cases in industry are currently dominated by cryptocurrencies, and the banking, financial services and insurance sectors (BFSI). Currently, the market for blockchain in enterprise, known as blockchain as a service (BaaS), is dominated by large tech companies such as IBM. These firms currently dominate the BaaS market and continue to drive the market forward.<sup>2</sup>

### BLOCKCHAIN REVENUE MODEL

There are three key revenue models for blockchain within enterprise: blockchain as a service (BaaS), blockchain-based software products, and blockchain professional services.

#### Blockchain as a service:

BaaS is the most popular blockchain business model and it provides businesses with an ecosystem to help manage their blockchain solutions. Firms are able to build blockchain applications on the platforms owned and managed by companies which host the blockchain. Similar to the software as a service business model, users pay a subscription fee, often paying for only the service they require. This field is dominated by established web hosting firms, such as Amazon Web Services and Microsoft Azure.

#### Blockchain-based software products:

These are the blockchain-based firms which design blockchain solutions and sell them to other firms. Proving the applicability of blockchain solutions can be extremely profitable, and this market is currently dominated by start-ups. This segment is a key driver of M&A activity in blockchain, as larger firms acquire innovative start-ups who design these blockchain solutions. An example of this is Accenture which provides blockchain services and solutions for 91 Fortune Global 100 companies.<sup>3</sup> They offer a range of services such as digital commerce, business strategy and blockchain mergers and acquisitions for their clientele.

#### Blockchain professional services:

These firms act as technology consultants for blockchain. These services are provided to businesses by development companies to help integrate blockchain solutions. For example, firms such as IBM and Deloitte can be hired to build custom blockchain solutions. This market is more saturated with both larger and smaller players and is expected to see high growth in the coming years.

These services have been proven to provide continual and profitable revenue streams, especially BaaS applications. However, as more firms begin to adopt blockchain, it can be expected that blockchain consultancy will see a large increase in demand.<sup>4</sup>

<sup>2</sup> Fortune Business Insights Blockchain market report, 2021, <https://www.fortunebusinessinsights.com/industry-reports/blockchain-market-100072>

<sup>3</sup> Accenture Fact Sheet, <https://newsroom.accenture.com/fact-sheet/>

<sup>4</sup> Blockchain business model, 2021, <https://businessmodelanalyst.com/blockchain-business-models/>

## BLOCKCHAIN VALUATIONS

Blockchains are able to bring efficiency gains to organisations, bringing with it predictable improvements in cash flows. However, certain risks must be considered when analysing the actual value that blockchain can add.

Much of the confusion from valuing blockchain use cases stems from the fact that there are two parts to consider: the underlying network and technology platform, and the applications which are built on top of this. From an enterprise perspective, the value comes from the applications themselves, and so this section will focus on valuing the actual applications themselves, rather than considering the merits of various blockchain platforms.

The four primary sources of value blockchains can deliver are:<sup>5</sup>

#### 1. New business models

Blockchain innovation can support businesses in creating new revenue streams, such as in the energy sector where blockchain platforms allow firms to trade excess energy stores autonomously and in real-time over the grid; smart contracts are used to execute energy transactions, creating a new market for energy.

#### 2. Operational efficiency

Blockchain enables process automation and the removal of unnecessary intermediaries. In real estate for example, blockchain could be used to eliminate the need for escrow accounts, as traditional escrow services can be replaced by smart contracts, lowering overall cost.

#### 3. Risk mitigation

Companies can use blockchain-related applications to improve tracing and authenticity across the supply chain. The security of the peer-to-peer network system ensures this and makes blockchain a viable application for services such as payment transfers, where security is an utmost priority.

#### 4. Social impact

Blockchain can support a wide variety of initiatives, including voting and election management. Since data on the distributed ledger is resistant to tampering, essential information such as voting records is more secure than on a paper-backed or a centralised electronic system where there have historically been fraud cases. Furthermore, to vote and by definition add a record to the blockchain's ledger, voters must verify their identity, increasing election integrity.

As discussed above, there are certain risks to be considered when valuing blockchains. Particularly, these stem from undeveloped standards of procedure, and high energy consumption when scaled.<sup>6</sup>

Due to the rapid growth of blockchain, there are no standards of procedure, with many different organisations working on their "own" blockchains. This leads to risks in terms of security and privacy. Hence, when valuing blockchains in relation to this point, it is important to consider the reputability of the creators of the network. More reputable established companies will have a premium of quality assurance.

Another significant factor to consider is energy consumption. Many blockchain networks create significant energy demands, with those relying on proof of work consensus mechanisms usually demanding the most. Especially when at scale these energy demands can be huge. Therefore, recognising the benefits and drawbacks of each type of consensus mechanism is essential to understand which one would be suitable to implement for a specific use. Particularly if scaling a network, understanding the energy requirements of the various consensus mechanisms is crucial for making an informed decision.

<sup>5</sup> Blockchain values, 2021, <https://www.sciencedirect.com/science/article/abs/pii/S0360835221000917>

<sup>6</sup> Blockchain risks, 2021, <https://101blockchains.com/blockchain-risks/>

## GLOBAL OUTLOOK

High growth is expected over the period 2020-2024, with 5-year annual compound growth rate in the blockchain market expected to equate to 48%. The same growth is anticipated in M&A transaction levels, with the global value of deals expected to rise significantly over the coming period. This section will consider the blockchain market over the period 2021-2027.

In particular, market growth is likely to be driven by innovative small and medium enterprises (SMEs) as opposed to the period 2015-2021 where growth was driven by larger firms. The SME segment is projected to grow at a higher CAGR over the forecast period, due to the need for streamlining the business processes cost-effectively across this area of the market. Currently, the adoption of blockchain technology is in the experimentation phase in most SMEs; however, the adoption rate in the SME segment is expected to increase significantly in the coming years, owing to low infrastructure costs and transparency. Such high levels of growth in smaller businesses is expected to propel the blockchain M&A market forward, as larger firms seek to acquire innovative smaller, fast-growing firms.

In terms of sectoral analysis, the BFSI sector is expected to remain the largest, as blockchain innovations in payments and insurance are monetised. Similarly, supply chain management is an area where blockchain technology is expected to mature over the coming years, and accompanying this is an expected higher volume of M&A activity.<sup>7</sup>

## REGIONAL OVERVIEW

The regional overview will consider the 3 largest blockchain markets: North America, Europe, and the Asia Pacific regions. Of these, the US is the current leader and is expected to remain in this position, simply due to the high concentration of technology focussed firms.

### North America:

One of the major reasons for the widespread development and adoption of blockchain tools in North America is the strong presence of small, medium, and large tech companies operating in the US. This, along with rising integration of BaaS solutions with public utility services, will enable the region to dominate the blockchain-as-a-service market share in the foreseeable future. This is coupled with strong governmental support and regulation, as since 2020, the US government has been exploring the possibility of the uses of blockchain within financial regulation.<sup>8</sup> Moreover, this has been coupled with an increasingly open attitude to the legality of smart contracts.

### Europe:

Europe has been deemed as the second-leading market for blockchain. Apart from this, the region can anticipate a significant surge in the adoption of blockchain technology in the coming years, because of the strong support from governments across various countries. Increasing focus of well-established players on blockchain technology will propel the market in the near future. Blockchain adoption has been slower in Europe when compared to the US, in part due to the coronavirus landscape and the larger firms being less willing to take risks on blockchain technology when compared to their American counterparts. The large BFSI sector in the European market is expected to drive high growth over the coming 5 years.<sup>9</sup>

### Asia:

The Asia Pacific (APAC) region is believed to be the third-most lucrative market for blockchain. In Asia-Pacific, the market will be mainly driven by the rising investment in blockchain technology by the Chinese government and advancements in complex computer technologies in Japan and South Korea. This will lead to this region likely having the highest growth in the blockchain market during the forecast period.<sup>10</sup>

For all three regions, blockchain growth is expected to be fast, and whilst there are differences across these markets, blockchain growth is expected to occur in similar sectors, i.e., BFSI and supply chain management.

<sup>7</sup> Modex Blockchain market outlook, 2021, <https://modex.tech/global-blockchain-market-expected-to-reach-usd-69-billion-by-2027/>

<sup>8</sup> IBM, March 2017 <https://www.ibm.com/downloads/cas/ZEOER4M9>

<sup>9</sup> BFSI growth, 2020, <https://www.livemint.com/companies/news/tcs-eyes-strong-growth-in-bfsi-vertical-in-europe-11608116802992.html>

<sup>10</sup> Blockchain in Asia, 2021, <https://paidnetwork.medium.com/the-rise-of-digital-currencies-and-blockchain-in-asia-93d25abf205f>





## BLOCKCHAIN BENEFITS & INNOVATIONS AS A SERVICE

*'Blockchain is an important part of a new generation of information technology. It is a new type of database software integrated with multiple technologies such as distributed network, encryption, and smart contract, through which data is transparent, resistant to tampering, and traceable. It has the hope to solve the trust and security issues in cyberspace, promote the transformation of the Internet from delivering of information to delivering of value, and restructure the information industry system.'*

- Shanghai Financial Information Industry Association, 2021.

Innovations in blockchain as a service are mainly in the development of advanced technologies, more efficient implementation, and creative application of a blockchain's core features. Below is a list of the core features of a blockchain database, with some examples of benefits achievable by the features stated:

### 1. Resistance to modification

- **Reduce operation costs:** by providing real-time data, allow real-time control, support collaboration with synchronisations.
- **Increase trust:** record and access evidence, reduce credit & investment risks, creating openness and transparency, while reducing information gaps.
- **Increased security & confidentiality:** advanced encryption methods.
- **Increased regulation:** easier to access by regulatory authorities.
- **User-friendly:** gives users full control of their own data, enforcing their right to know.
- **Capitalise hardware space:** data can be stored and accessed anywhere and anytime.
- **Creative applications:** allow digital assets such as non-fungible tokens or electronic vouchers to be realised.

### 2. Consensus methods

- **High fault tolerance:** by applying advanced validation methods.
- **High scalability:** by applying advanced validation methods, ability to intake more nodes into the network.

### 3. Smart contracts

- **Reduce costs:** eliminate third parties, and human errors. Simultaneously follow multiple processes.
- **Additional connections:** electronic devices can become nodes and upload additional real-time information to the chain.
- **Rigorous methodologies:** actions exactly follow the intended rules. Eliminate human error or tampering.
- **Incentivises healthy competition:** promote increase in user's core values by removing potential unfairness.

### 4. Traceability

- **Increased reputation and trust:** ensure safety and effectiveness, reduce user anxiety, and strengthens trust.
- **Reduce error costs:** able to assess the value of end products more effectively.
- **Saves user's time:** access of historical data, reduce re-examinations error.
- **Fraud prevention:** by being traceable.
- **Increased regulation control:** regulatory authorities and governments can have better access to information.

### 5. Layers

- **Increased effectiveness:** decoupling layers to increase security, sustainability, and scalability.
- **Reduced cost of implementation:** be compatible to most existing technologies.

The following are some examples of blockchain technological innovations in action (for more examples, see appendix section):<sup>11</sup>

<sup>11</sup> Published by Shanghai Financial Information Industry Association, 2021, individual information provided by respective companies

Company Name	Blockchain Benefits Capitalised	Blockchain Name	Application Area	Results & commercial value	Technology/ innovation
Hunan Hexin Anhua Blockchain Technology Co., Ltd.	<p><b>Resistance to modification:</b> Reduce operation costs.</p> <p><b>Smart contracts:</b> Reduce costs, incentivizes healthy competition</p> <p><b>Traceability:</b> Increased reputation and trust, fraud prevention, increased regulation control.</p> <p><b>Layers:</b> Increased effectiveness</p>	Hexin Cloud Chain	Construction project management	<p>Support the multi-party collaboration of construction projects, and support the integrated model of investment and financing, development and construction, operation, and management.</p> <p>Provide objective, credible, and traceable data support for the entire life cycle of the construction project process, and provide tools and solutions for process-oriented, credit-based, and goal-driven project management.</p> <p>Scene evidence, engineering evidence certificate on the chain, encryption protection, transparent sharing and efficient collaboration, transparent settlement of funds, fund flow supervision, performance supervision and evaluation.</p>	<p>Realtime control on the integrated blockchain open service platform HxBaaS.</p> <p>Model modular design: Rule engine technology separates business rules from application code, making the implementation of complex business rules simpler.</p> <p>Microservice architecture: To ensure the security of user login, system data access, etc.</p> <p>Decoupling business layer: The platform is divided into application layer, basic service layer, rule service layer, blockchain service layer and underlying infrastructure. To increase security and sustainability.</p>
Propy	<p><b>Resistance to modification:</b> Increased security &amp; confidentiality</p> <p><b>Smart contracts:</b> Reduce costs, additional connections, rigorous methodologies</p> <p><b>Traceability:</b> Increased reputation and trust, fraud prevention</p>	Propy	Listing platform, trading platform and blockchain property registration.	<p>Automate real estate sales process through distributed accounting and smart contracts, reduce transaction time and cost, and reduce fraud.</p> <p>Has assisted more than 1,000 real estate transfers, thousands of home purchases, and completed transactions worth more than 1 billion USD.</p>	<p>Distributed ledgers and smart contracts to ensure data security, transparency, and promote the automation of real estate sales processes. After the smart contract is triggered, the code will be automatically executed, and once the contract is established, it cannot be changed or deleted.</p> <p>Created real estate NFT to ensuring property rights and reduce the risk of real estate investment.</p>
Suzhou Yuhu Blockchain Technology	<p><b>Resistance to modification:</b> Reduce operation costs, increase trust, increased security &amp; confidentiality, increased regulation</p> <p><b>Consensus methods:</b> High fault tolerance</p> <p><b>Traceability:</b> Increased reputation and trust, increased regulation control</p>	Yuhu Digital Agriculture Alliance Chain	Agricultural supply chain	<p>Production-end data: for consumer traceability and government food safety supervision.</p> <p>Supply chain data: reducing information transmission time and labor costs, and helping to improve the supply chain collaborative efficiency.</p> <p>Consumer personalized data: achieve precise docking and promote the balance of production and sales.</p> <p>Financial credit data: help agricultural business entities establish a credible data credit system and reduce threshold of agricultural business entities' access to financial services.</p> <p>Government: added as a super node, can access and review the data of the supervised production enterprises according to the permission setting.</p>	<p>Nodes are divided into consensus nodes and observation nodes. Consensus nodes will participate in the entire consensus process, packaging blocks as bookkeepers and validating blocks as verifiers to complete the consensus process. Observing nodes do not participate in consensus, synchronize data, verify, or save, and can provide services for data servers.</p> <p>PBFT consensus algorithm can tolerate common failures such as server downtime. It can also tolerate Byzantine faults such as deliberate deception of some nodes and forged transaction execution results. It can tolerate up to one-third of failed nodes and malicious nodes to achieve eventual consistency.</p>
Decoo	<p><b>Resistance to modification:</b> Reduce operation costs, capitalize hardware space, creative applications</p> <p><b>Consensus methods:</b> High scalability Decoo</p>	IPFS Pin/Host	Provide internet users with available, easy-to-use distributed cloud storage services	<p>The distributed storage resources connected to Decoo have exceeded 500PB. With the support of low cost, Decoo adopts a free model, allowing a large number of users to use Decoo to store and distribute files. Some users with greater needs (about 10%) will be converted into paying users and contribute profits to the business. Other users will enjoy Decoo's free functions and accumulate on the application. Decoo and then seek monetization from advertisers based on the user traffic.</p>	<p>Provide a reliable technological path for the digital resource-sharing society, make full use of idle hard disk space, users who contribute storage space can benefit from it, and users who use storage space can greatly reduce costs, resulting in a huge economy value. Using blockchain technology to make full use of the idle storage resources of the society, the storage cost is about 10% of the traditional cloud service. Since user files are saved by multiple nodes around the world, it can effectively resist the risk of a single point of failure. User files are stored by a large number of nodes with random physical distribution, so for user who wants to obtain the file can access these nodes anytime and anywhere, to enjoy the distributed "Network acceleration" effect.</p>

## OUTLOOK FOR BLOCKCHAIN TECHNOLOGY

Stirling Infrastructure Partners have identified two key blockchain use cases which we believe will see significant development in the coming years: supply chain management, and smart contracts.

Firstly, blockchain implementation in the supply chain will likely increase dramatically over the coming years. Through a single immutable ledger, supply chain transparency can be increased. As information and inventory flows are codified and recorded in the blockchain ledger, supply-chain managers gain complete visibility into the transactional history between retailers and suppliers. This also eliminates many blind spots that exist in traditional record keeping and provides a level of visibility that improves coordination between parties. Back-and-forth communications are reduced, because there is a single source of truth that each party can refer to. Instead of calling a distributor to see whether a shipment is on its way, the ledger provides dynamic access to that information.

Secondly, as government regulation begins to recognise smart contracts in law, they will see widespread use. With the use of smart contracts, such as those developed by Ethereum, both buyer and seller can create "if / then" contracts in which one step of the process won't be fulfilled until the one before it has been verified complete. Blockchain can serve as an objective, trustworthy, third-party mediator in pretty much any interaction, deal, or partnership you can imagine.

These two use cases of blockchain will have far reaching consequences across a multitude of sectors and industries. Smart contracts have the potential to replace existing written contracts in almost all cases, and once technological difficulties in implementing blockchain into the supply chain are overcome, this application too could be revolutionary.

Many firms which are looking to design solutions to these problems and advance blockchain technology forward over the coming years will likely see success. These two crucial use cases have been revolutionary and the most likely to be implemented over the coming years.

## STIRLING INFRASTRUCTURE PARTNERS CASE STUDIES

### AREAS OF INTEREST

Stirling Infrastructure Partners specialises in eight areas: battery storage and smart grids, communication infrastructure, electrical power networks, gas, renewable energy, smart infrastructure, transportation, and water and environment. The core business advises asset managers, listed companies, and project sponsors on capital-raising and M&A services in emerging and developed markets.

### WHAT VALUE CAN STIRLING ADD TO A TRANSACTION?

The firm uses its relationships from prior transactions to bring cooperative lenders together to deliver quickly and at competitive rates.

What makes Stirling Infrastructure unique is its market knowledge and relationships with mainstream and specialist infrastructure lenders, some of which are lesser known in the market. The firm does not have a specified restriction on any jurisdiction. Stirling Infrastructure has expertise in:

- Finding the lowest cost of capital, with favourable lending terms, from a variety of lenders for refinancing or non-complex transactions.
- Giving more complex capital structures access to specialist lenders, who specialise in unique infrastructure financing and special situations allowing Stirling Infrastructure to offer more bespoke solutions.

Stirling Infrastructure has experience working in an M&A advisory role for a technology focussed firm implementing blockchain solutions within the supply chain, one of the key areas we have identified as showing potential for growth.

### STIRLING INFRASTRUCTURE PARTNERS' SERVICES

We understood how the sectors and stake holders operates, evaluated the proposal of the client, then raised and instructed the following points:

- How to develop and put together a strategy in the blockchain network.
- Put together the pitch book and investor memorandum for capital raising.
- Shortlisted the ideal investors.



# Blockchain Case Studies

## CONCLUSION

Blockchain is a technology emerging from its infancy in many sectors and this presents a huge opportunity for many market participants, reflected in the increase in activity in the M&A market. As demonstrated, the high pace of innovations is leading to an increase in use cases, and once the key hurdles of regulation and scalability of blockchain technology are overcome, blockchain will become a more global technology. In our view, blockchain is expected to become a leading technology in the near future. Enterprises across the globe are beginning to realise its huge potential, and in particular it is its applicability across a number of sectors which gives it such potential. Once governments and industry leaders can begin to understand blockchain technology, and how it can be implemented into organisations, it will become crucial to the efficiency of many organisations.

## APPENDICES

Figure 1<sup>12</sup>

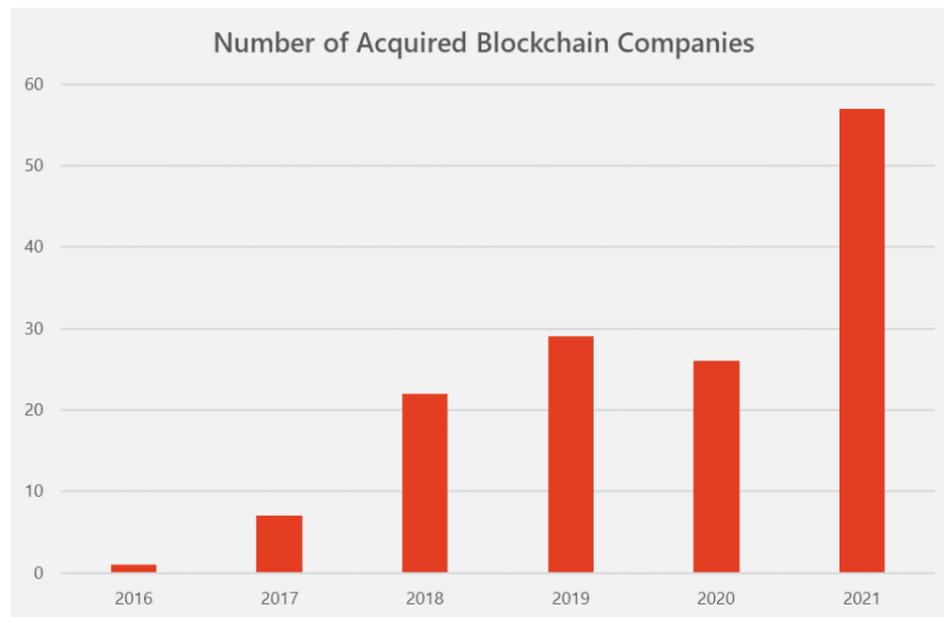
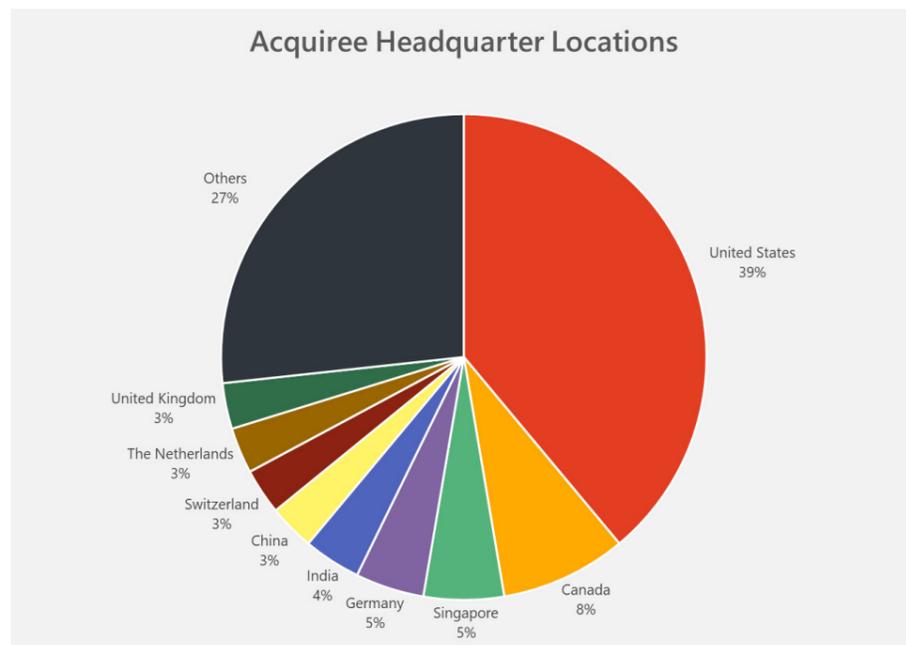


Figure 2<sup>13</sup>



12 Data by Crunchbase  
13 Data by Crunchbase

Figure 3<sup>14</sup>

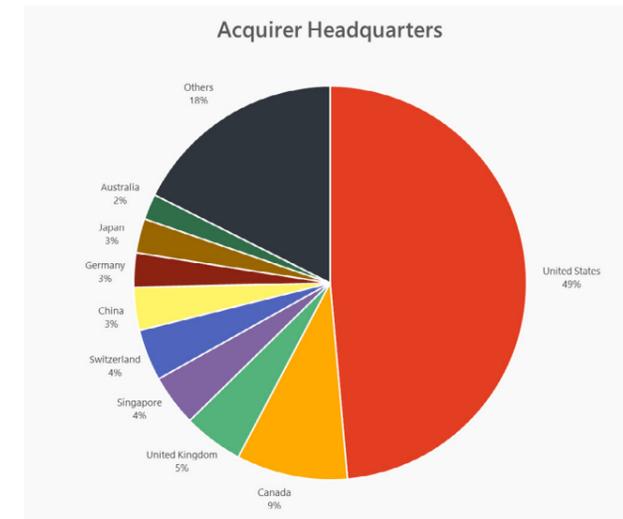


Figure 4<sup>15</sup> \*note all acquiree have the 'blockchain' tag which is omitted in the graph

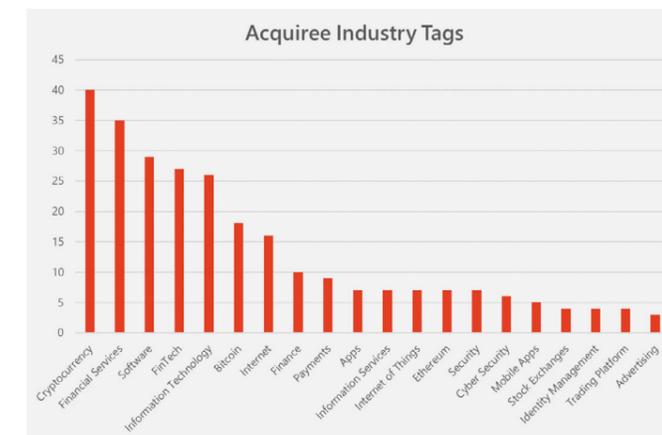
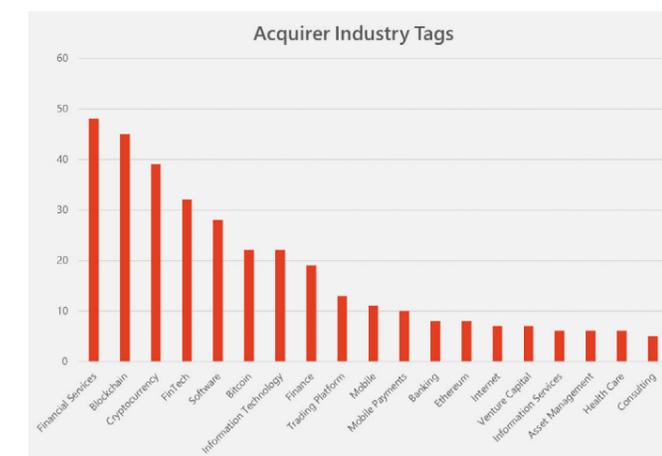


Figure 5<sup>16</sup>



## REFERENCES

Figure 1, 2, 3, 4, 5: Data by Crunchbase.

Section 2 & Section 5 Blockchain innovation examples: Published by Shanghai Financial Information Industry Association, 2021, individual information provided by respective companies.

14 Data by Crunchbase  
15 Data by Crunchbase  
16 Data by Crunchbase

# ADDITIONAL BLOCKCHAIN INNOVATION EXAMPLES<sup>17</sup>

Company Name	Blockchain Name	Application Area	Results & commercial value	Technology/ innovation
VeTrust	VeChain ToolChain™	Intelligent management and control platform	Public enterprises can find infection risk management services that are more suitable for their own development on the basis. Build a better public image during the pandemic period, turn it into self-inspection through long-term optimization of its own food safety and hygiene management level. Government digital management: real-time public health and safety information. Social benefit: Health, hygiene and safety of living and working environment. Economic benefit: Actively building a proactive prevention system is the most economical and effective health strategy.	Publish one's own QR code, publicize the pandemic prevention work of all joints to the public in a complete and transparent manner, enhance brand image and trust. Change from passive inspection to active self-inspection, with data intelligent technology guarantees the effectiveness and sustainable improvement of the self-inspection effect.
Xiong'an New District	Fun Chain	Fund supervision system	Connected to 5 banks, supporting 10 banks' cross-chain payments, supervision on single project exceeds 1 billion CNY. Total supervision will reach ten billion CNY. Regulatory authorities: a platform-based, standardized, and traceable supervision and management mechanism. Project participating companies: reduce credit risk of all parties, has been reduced, obtain efficient financing channels. Financial service institutions: reduce customer costs and investment risks.	Efficient data intercommunication and business collaboration, synchronize institutional data, project data, contract data, and payment data in each participant node on the consensus chain, perform data authority management based on the role of the participant, and realize automatic allocation of construction funds based on smart contracts.
Zhaorong	MT data value integration Service Platform	Integrate data resources in the electricity industry	Provide data governance, data sharing, data value creation, data value empowerment services. Accurately portrait service for suppliers, data service of accounts receivable voucher, comprehensive evaluation service of supplier contract performance, accurate analysis and forecast service of power generation, power transaction confirmation and credit enhancement services, safety supervision data sharing service, power insurance financial services, smart financial smart contract settlement service, regulating and operating data storage services. Estimated number of active users of the platform will reach 2,000 in 2022, providing data value financing services for 600 enterprises. The platform has applied for 9 related blockchain invention patents (including 1 authorized patent), and 8 software copyrights.	Using blockchain group to support big data technology data lake. Network layer: P2P anonymous communication technology, and an anonymous access mechanism between nodes to ensure privacy protection of information services. Blockchain layer: Blockchain bottom payer technology platform MTI covers consensus mechanism, smart contracts, cross-chain technology, side-chain technology, compatibility and scalability, etc. Processing layer: Digital financial service, asset query service, power business service.
SimMed	SimMed Chain	Healthcare data services, cooperation between the hospital and the external partners.	Simplify the insurance application process for users and improve the risk control capabilities of insurance institutions. Application on wearable device to combine sports, fitness, health, medical and insurance data. Reinsurance industry can use blockchain technology to automate most business processes, reduce human errors and save labor costs.	Putting information on the chain and implement supervision without programming. Smart contract template for the medical industry. Support real-time and secure sharing of off-chain data.
SimMed	Chinese medicine chain	Safe circulation of prescriptions, traceable decoction and delivery service, patient inquiry service	Promote industry self-discipline. Hospital: Ensure the accuracy of data on the circulation of prescriptions. To ensure the safety, effectiveness, and traceability of medicines. Patients: Transparent process to eliminate anxiety. Strengthen the trust of doctors and patients, protecting patients' right to know. Service entities: Participate in the full-process certificate management and traceability of various business formats, open and transparent operations, and enhance brand influence. Regulatory authorities: Reliable supervision methods, ensure quality, safety, and promote model innovation for the supervision of the circulation of Chinese herbal medicines	Data sharing & security, protection of privacy & the right to know, fast and effective supervision.
ICBC Shandong Branch	LuMedChain	Internet + medical insurance + medical treatment + medicine comprehensive medical security system.	Solve the problem of unbalanced development of medical security. Service needs such as online consultation, re-examination and purchase of medicines, renewal of prescriptions for chronic diseases, and medical insurance payment and settlement. Transform paper prescription to electronic, prescription information sharing to solve the problem of chronic diseases and other patients who have been admitted to the hospital for multiple times, medical insurance system payment information on the chain, traceable payment transaction history, traceable drug production & delivery. The platform saves about 90% of the offline medical advice time for patients with chronic diseases. ICBC is the first commercial bank in China to issue electronic medical insurance certificates, won the "China International Blockchain Technology and Application Innovation Achievement Award" at the 2020 China International Blockchain Technology and Application Conference.	Business platforms including internet health, electronic prescription circulation, medical insurance electronic payment certificate, medical logistics, drug consortium, drug traceability, and ICBC medical insurance blockchain technology platform. Industry-leading high-efficiency fault-tolerant consensus algorithm, achieves a TPS of more than ten thousand in the evaluation environment. Large files distributed off the chain, only the hash value and other basic data of the file on IPS are stored on the chain. Blockchain medical alliance ecosystem of physical hospitals, internet hospitals, pharmacies, pharmaceutical factories, logistics groups, and banks.
Weiguan Tech	D-Health Global Digital Healthcare Chain	Ensure the quality of medical supplies, product quality, market safety and compliance, and market stability while meeting global supply needs.	Fair environment with distributed accounting, resistant to modification, technical consensus, information security. From end of June 2020 to end of 2020, China's cumulative export transaction amount on the chain reached about 1.1 billion CNY. Social contributions: Create a good reputation for the quality and competitiveness of "Made in China" in the global market. Provide a complete evidence chain and credible data support for quality and trade disputes after export. Industry influence: Integrate international evidence deposit centers and judicial institutions.	Multi-terminal self-adaptive operation, convenience of adding data to the chain, Smart tracing of cargo, logistics, customs clearance, and judicial certification information.
MedicalChain	MedicalChain	Health data	Reduce the cost of medical care and improve patient satisfaction while ensuring the safety of patient data. To doctors: Reduce the medical errors caused by failing to understand the patient's health record in detail and reduce the error rate and time cost of the traditional medical record method. To patients: control who can access their information to protect privacy. In addition, the medical information sharing platform can more conveniently complete global medical services.	Dual blockchain structure (Hyperledger Fabric and Ethereum) supports platform operations. Give patients full control of their health data, use blockchain technology to ensure privacy and auditability, avoid vendor lock-in by adopting open standards, and support third-party applications on the "platform as a service" model.
Baidu	Baidu Super Chain	Internet of Things Programmable Advertising Platform. Implement advertising monitoring, track advertising effectiveness.	The blockchain has reached 140,000 nodes and 1 billion data, 87,000 TPS for single chain, 200,000 TPS for overall network. All playback data can be checked on the chain, which reduces the cost of blockchain link entry. Ensure that the data obtained is authentic with credible source, prevent data fraud, and have distributed records.	Over 100,000 or even millions of offline advertising screens interact with data in real time on the blockchain. Advertisers themselves can participate in trusted data collection. Endorsement by the judicial Department. "Light node" only maintains all transaction header data and its own transaction data, with the size at one tens of thousands of a full node. Support a variety of load balancing algorithms, and perform regular health checks and maintain on server machines, and seamlessly expand and delete servers. Buffer zone ensures that the transaction data what is temporarily stored in the memory or hard disk and will not be lost when network communication is poor.
Chengzhou University	Mountain Chain	Education data management, such as data confirmation, security storage, and traceability audit.	Each school binds a unique blockchain account as its blockchain identity. Universities can store or obtain information on the chain. Cover data collection, storage, utilization, sharing, handover, and destruction. Adopt technical means such as data fingerprinting, distributed storage, trusted consensus, and field-level encryption to promote the establishment of a security system and sharing mechanism for talent training data. Empower the teaching management system, manage the entire life cycle of student training process data, and provide a solid and credible foundation for promoting better development of talent training.	Ensure that the credits and evaluation data cannot be tampered with, and multiple active nodes ensure the safety and reliability of the system. Compatible with existing systems and traditional databases to smoothly upgrade with minor changes. Meets the needs of information privacy without building a centralized system, with credible data sharing between colleges and universities. Data sharing plan breaks through the traditional centralized model. All colleges and universities obtain data directly from the nodes in the city and respond more quickly to transfers and advancements.
MadHive	MadHive	Reduce the monopoly of intermediaries in advertisement and bring buyers and sellers closer together.	Restore transparency in the advertising industry, prevent fraud and ensure that advertisers can accurately track their use of funds. Promote decentralization and achieve a transparent revenue stream. Solve the losses caused to advertisers by opacity in the advertising industry, prevent middlemen from charging the media excessive profits. Core layer responsible for determining which media can match which advertisements. Decentralized approach with no one party can control or manipulate the way advertising is delivered.	Encryption verification measurement and performance analysis reduce costs and improve efficiency. Data layer enable advertisers and publishers to directly share advertising performance and interaction data. Core layer responsible for determining which media can match which advertisements. Decentralized approach with no one party can control or manipulate the way advertising is delivered.
Hangzhou Government	Hangzhou Blockchain	Electronic stamp	Unified electronic stamp platform to see the official, financial, invoice, and legal representative stamps. Application rate of the blockchain electronic stamp application platform exceeded 60% in Hangzhou. Accelerate the digital transformation of enterprises, build corporate credit system, optimize the business environment, strengthen government supervision capabilities, and escort the development of the digital economy. Solve the security problems of corporate stamp management, loss, snatching, and forgery with the help of the features such as non-tampering and full-process traceability of the blockchain.	Cryptography technology and public key infrastructure requires identity verification every time a stamp is used, can also set stamp approval methods, and record stamp usage. Enterprise can simultaneously apply for an electronic stamp when registering the company, and issued simultaneously with the electronic business license.

Company Name	Blockchain Name	Application Area	Results & commercial value	Technology/ innovation
Shanghai Hudu Technology	Remittance blockchain	Certificate depository and notary office	APP supports multiple certificate access methods, such as photos, video, screen recording, telephone recording, file uploading, etc., with no limit on time, location, and network environment. Users who deposit certificates can perform operations such as obtaining, depositing, and issuing certificates through the App. At the same time, a user Web page can manage and issue certificates of deposit data. Users of the notary office can realize the functions of managing all the depositing users and depositing data, and reviewing the data applied for issuance, through the Web management terminal.	The platform provides simple, intuitive and convenient maintenance and management methods. Any citizen can directly register on the publicly released open registration channel. Can perform original document storage verification on the original electronic evidence to verify whether it has not been tampered with to ensure the authenticity, validity, and integrity of the electronic evidence. Enterprise can directly call open services and focus only on their own business to realize functions such as automatic deposit, automatic access, and automatic certificate issuance. The electronic version of the deposited certificate can be generated online.
Ant Blockchain Technology	Ant Blockchain	Reducing the decision-making cost, trust cost and transaction cost of IP authorization.	Change the IP licensing market from the original "wholesale" model to the "retail" model. IP users no longer need to pay a high guaranteed license fee, "pay as much for how much you sell", and the smart contract automatically clears the share, which greatly reduces the uncertainty of whether the business can recover the cost of copyright procurement.	Multi-party consensus distributed IP alliance. Manage IP authorization transaction rules through smart contracts, realize online and real-time transaction sorting, lower the threshold for merchant transaction authorization, and improve the copyright owner's digital authorization management capabilities. Genuine IP based on cryptography and privacy protection.
Shanghai Distribution Information Technology	Gangbao Digital Supervision Warehouse	Steel trade	Cargo real-time monitoring, price mark-to-market, cargo tracing to the source, warehouse receipt information cannot be tampered with, ensure consistency of manifests, risk control in financial institutions, and solve the long-standing insufficient working capital of large traders and difficulty in obtaining financing. Accumulatively cooperated with 4 financial institutions, with a total credit of 338 million CNY.	Automatic positioning, movement, comparison of operation data; automatic capture of weighbridge data and feedback to the system; realization of remote operation, unmanned operation, and machine supervision. Open up the supply chain financial platform to realize the warehouse operation process of goods entering the warehouse and pledged released. Realize customer online appointments, provide recommended scheduling, improve the warehouse expectation system, and reduce the workload of repeated confirmation of appointments.
Shanghai Juah Information Technology	Longping Chain	Introduce external financial institutions to solve the SME's problems of financing difficulties.	Strengthen supply chain management, improve the synergy efficiency of members, reduce the overall cost, and enhance the comprehensive competitiveness. Agriculture: Realize upstream supplier's accounts receivable financing ("seed production loan") and downstream distributors' advance payment financing ("seed loan"). Energy: Meet the needs of different corporate financing product designs in various scenarios in the Hainan International Energy Exchange Center, four standardized products have successfully derived six financing solutions.	Internet of Things technology to dynamically monitor the flow of goods, record transaction, transportation and other node information, reduce the risk of fraud. Smart contracts solidifying the fund's clearing path, and cooperating with the payment system can greatly reduce the occurrence of fund misappropriation and breach of contract. Electronic vouchers can realize flexible multi-level splitting, circulation, and financing, transfer the core enterprise credit to the end supply chain, and solve the financing difficulties of small and micro suppliers.
Micro (Tianjin) Technology Development	TBC Blockchain	International express	Record of transaction, commission, transportation, warehousing, customs clearance, shipping, insurance, financing, settlement, and tax payment. Promote participants to focus on improving their core competitiveness, to gain recognition, benefits, and high-quality services, and make the overall ecology of cross-border trade develop in a virtuous cycle. The platform provides customs service personnel with preset marks, alert inconsistent data, internal classification, price review, anti-smuggling, tariffs, and supervision to form early warnings and results.	Any node has a copy of all records, asymmetric encryption by public and private keys, can obtain credible data on demand and reduce business intervention, ensure fairness and consistency of distributed systems through technical consensus. Connection with the single window of the General Administration of Customs. Form a scientific contribution value evaluation system that conforms to industry applications and business laws. Convenient for the customs to implement targeted and supporting landing policies.
Shanghai Yikong Electronic Commerce	Yikong Chain	Retail	Incentive retail shop customers to automatically write each piece of commodity transaction data into the blockchain to ensure transaction data will be accurate and credible. Manufacturers can redeem new product display support, promotion support, data service, etc. to retail stores. Support credit investigation, credit extension, risk control, etc. of retail stores. Has realized transaction data of more than 10,000 retail stores, and has launched commercial cooperation with Coca-Cola, Pepsi, Nestle and others.	Solved the bottleneck of trusted data which restrict the efficiency improvement of the retail industry. Solves the problems of credit investigation, risk control and credit granting of small and micro enterprises, with a low-cost and replicable financial service platform. Commercial practice with industry-leading concept of data ownership, usage rights and income rights. Fully autonomous and controllable blockchain bottom-layer and upper-layer application development. Customers of small retail stores can be rewarded with points to use the store's services to help the in-depth development and management of consumer and community group purchases.
KLM Digital Studio	Unchain	Financial settlements between KLM and its subsidiaries	Lowers the threshold for enterprises to apply blockchain technology for digital transformation, without the need to fully change existing technology system.	Use R3's Corda blockchain to design and implement accounting and settlement functions, and to record, manage and synchronize data. Various technical systems and hardware of the enterprise can be seamlessly connected with the blockchain.
Maersk	TradeLens	Promote efficient and secure global trade, support information sharing and transparency, and promote industry-wide innovation.	Centralize all parties in the international supply chain, including traders, freight forwarders, inland transportation companies, ports and terminals, liner companies, customs and other government agencies, in a secure and distributed database. Allow all participating parties to communicate more efficiently, and use the Internet of Things and sensor data for temperature control, container weighing, etc., to let relevant stakeholders obtain real-time data and transportation documents. The platform has captured more than 154 million pieces of cargo transportation information. With the support of MSC, CMA CGM, Hapag-Lloyd and ONE, and five of the world's six largest container shipping companies.	Distributed and multi-centralized characteristics can reduce intermediate links, simplify operation procedures, improve operation efficiency, and save operation costs. Smart contract reduces the need for a large number of documents, realizing paperless operation. Reduce the information gap in the shipping industry, induce new credit evaluation model and financial innovation.
Shanghai Wanxiang Blockchain	BoAT+PlatONE	Managing operations, asset supervision and mortgage loans in the beef agriculture industry.	Mapping of beef value at different time points in the real world on the blockchain, thus forming a dynamic and traceable beef blockchain asset value. Give play to the value of cattle as a credible biological asset, turn beef into a traceable digital asset, which is convenient and more scientific for the operation and management of the whole process of cattle breeding, so that large and complex beef industry can be capitalized and digitized for adopting open standards. Financial institutions can correctly assess the value of cattle based on data assets and can also monitor cattle dynamics in a timely and effective manner, and correctly judge asset status, to achieve risk-controllable financing services. Small and medium ranches can gradually realize various functions of internal management and external services, thereby saving management costs.	Connect multiple ranches, farmers, and financial institutions, and realize multiple business processes and related approval processes such as beef asset investment and beef asset mortgage, making a universal financial service system. Record and screen every stage of beef production. Helps the government to establish a food traceability mechanism and improve the level of food safety management. Determine abnormal data by analyzing the data sent by the IoT collar and send an alert message to the holder of the data source in real time. Farms can avoid risks in advance or formulate future production to improve efficiency.
Jiangsu Hengwei Information Technology	Vaccine traceability platform	Vaccine certificate & traceability platform	Using Internet of Things to collect and test vaccine refrigeration data and issue warnings to managers in time. Effectively manage the production data of the vaccine and ensure that the data on the circulation of vaccines in all links is true and effective.	Internet of Things equipment collects vaccine information and detects whether the vaccine data is normal in real time. Ensure authenticity and transparency of the data on the chain and achieve the full traceability of the data. Each vaccine is marked with a unique NToken, and the vaccinators can inquire about the vaccination information by scanning the source code to ensure the safety and reliability of the vaccination.
AgriLedger	AgriLedger	Agriculture supply chain	All data in the entire supply chain are jointly verified and maintained by all participating entities, achieving transparency in each link of agricultural product production, processing, transportation and sales, which can effectively solve the problem of information asymmetry among participating entities. Consumers can also inquire about core information such as the origin of agricultural products, fertilization and drug usage, chemical composition, etc., to eliminate the trust crisis in the quality and safety of agricultural products.	Provide free smart phones to farmers and agricultural cooperatives, with a built-in agricultural production management APP based on blockchain technology. This APP contains 6 basic functions: Planning, Receiving, Selling, Buying, Basket, Wallet, and other functions can be added according to the different needs of farmers in various places. Asymmetric encryption technology and time stamp technology ensure the security and uniqueness of data in the transaction process. Each participant establishes a trust relationship between each other based on trusted data. Commitments of both parties to the transaction can be automatically executed using smart contracts. Can realize the credible circulation of business flow, information flow, logistics and capital flow.
Hangzhou Yunlian Qilian Digital Technology	Yunlian Qilian	Provide one-stop services for banks and other related capital parties	Solves the practical problems of long supply chain business process, large amount of data, difficulty in financing, etc. Can record, store, transmit, verify, and analyze information and data through procedures without compromising the confidentiality of the data, thereby forming credit. Simplify the transaction process, automate the execution of contracts, improve transaction efficiency, and reduce the costs and cost of idle funds. A total of 4 nodes were connected, and the number of registrations reached 96,992, with a registered amount of 187.8 billion CNY.	Consensus mechanism: Establish fair data writing rights, determine the synchronization mechanism of data in the chain. Random factor encryption: At least 3-layer encryption on industry and finance data. Data decentralization governance: No plaintext data is stored on the blockchain. When querying data, a decryption key is obtained through a smart contract, then the decrypted data is fed back to the application layer.
Shanghai Yuhu Information Technology	Jingkuang	Consumption platform for circulation, conversion and value integration of digital points and coupons.	Realize the credit rating system and data sharing center, share corporate credit and business data with regulatory authorities, consumers and financial institutions. Users can obtain various merchant cards, coupons and points, and convert them into tradable and transferable digital assets. Merchants can issue cards, coupons and points through the digital asset business system, and use convenient digital asset trading channels to achieve fast and accurate marketing. Make the issuance, sale, verification and use of online coupons and coupons open, transparent, and traceable, simplify the procedures and operations of online coupon issuance, reduce online coupon issuance costs, and connect merchants online. The circulation barriers of cards and coupons give full play to the role of blockchain in promoting data sharing, optimizing business processes, reducing operating costs, improving the efficiency of collaborative supervision, and building a credible system.	All digital cards and coupons can circulate between card and coupon holders, such as gifts or transactions. Users can also choose to put assets into the trading market, and use pending orders to sell assets alongside merchants in the trading market for other users to choose to buy.

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## FOR FURTHER INFORMATION

This paper provides insights into trend data with analysis for institutional investors to make an informed investment decision into blockchain technologies.

The firm provides a comprehensive range of services which includes M&A transaction services and raising both debt and equity to finance blockchain technologies globally.

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